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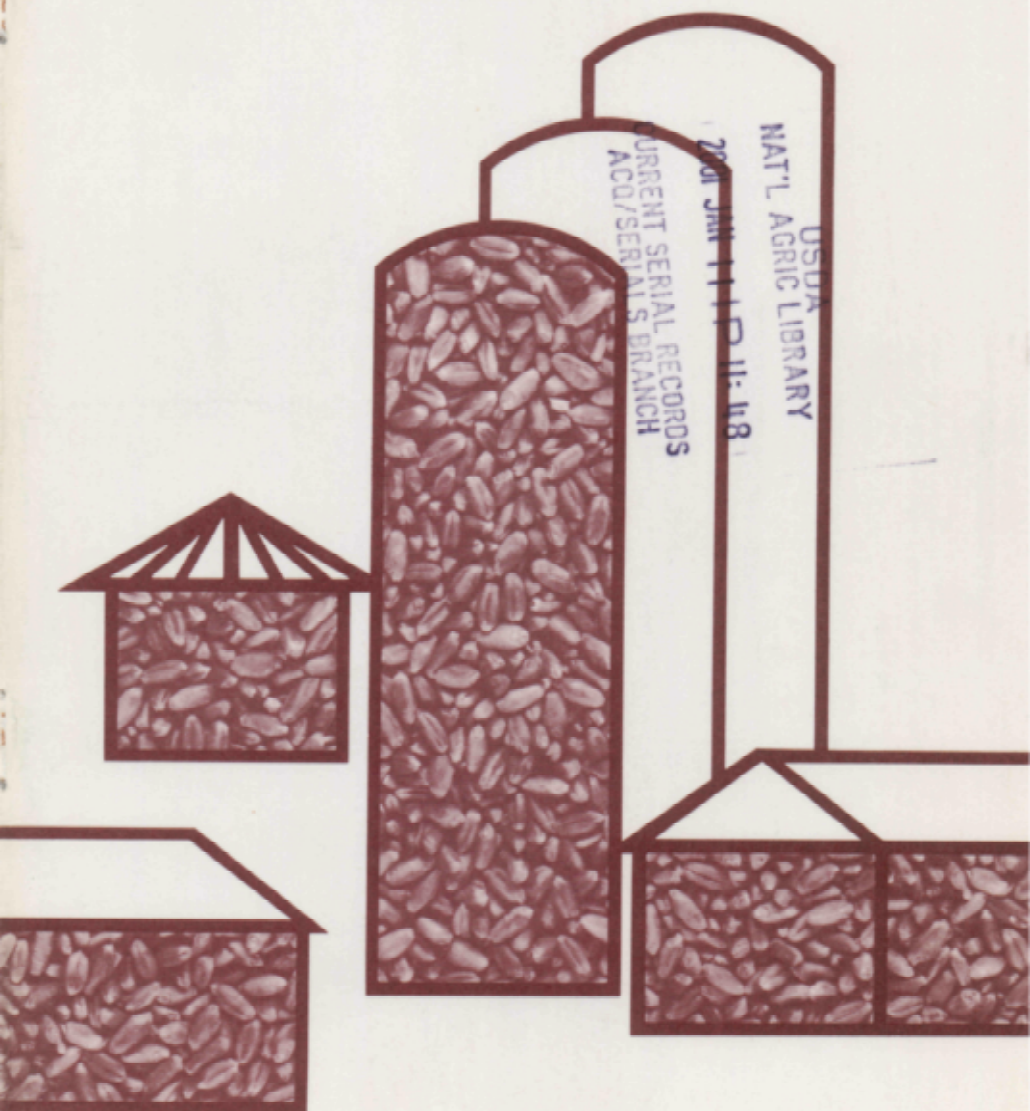
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# An Evaluation of U.S. Grain Reserve Policy, 1977-80

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## **An Evaluation of U.S. Grain Reserve Policy, 1977-80.**

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### **Abstract**

This report examines the costs and benefits of the U.S. grain reserve policy over its first 3 years. The policy, instituted in 1977, consisted of the farmer-owned reserve (FOR), new rules for releasing CCC-owned grain, and an expanded loan program to help farmers finance construction of grain storage facilities. During the years studied, the policy provided over \$1 billion in incentives and payments to expand the quantity of grain stored in the United States. In return, the United States obtained more buffer stocks, more storage facilities, more Government control of the Nation's grain, and somewhat higher grain prices as the reserve accumulated.

**Keywords:** Grain reserves, farmer-owned reserve, wheat, corn, policy.

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## Summary

During the first 3 years of the farmer-owned grain reserve, emphasis was placed on building stocks. The U.S. Government spent \$1.2 billion (through incentives and purchased services) to increase the amount of wheat and corn placed in the reserve. In return, the United States obtained more buffer stocks, more storage facilities, more Government control of the Nation's buffer stocks, and somewhat higher grain prices as the reserve accumulated.

The U.S. grain reserve policy that was instituted in 1977 consisted of the farmer-owned reserve (FOR), new rules for releasing Government-owned grain stocks into the market, and an expanded program of low-interest loans to farmers to help finance construction of grain storage facilities. This report examines the costs and benefits of that policy in its first 3 years.

Although there were fluctuations in the quantity of stocks in the reserve during that time, significant reserve stocks accumulated. By the end of the 1979/80 corn marketing year (September), there were 729 million bushels of corn in the FOR and 256 million bushels owned by the Commodity Credit Corporation (CCC). Those reserve stocks represented 60 percent of the total U.S. corn inventory. About 40 percent of the U.S. wheat inventory was in the FOR and CCC at the end of the 1979/80 wheat marketing year (May).

Analysis of the 3 years' data also showed:

- Total grain stocks carried over at the end of each marketing year increased by less than the amount placed in the FOR. One bushel placed in the FOR increased total stocks by less than 1 bushel (at the most, 0.7 bushel and, most likely, 0.4 bushel). Based on the lower figure, it cost society about \$1 to add 1 bushel of corn to carryover stocks, and about 90 cents to add 1 bushel of wheat.
- The annual storage, handling, transportation, and interest charges associated with the CCC-owned grain averaged 56

cents per bushel of corn and 63 cents per bushel of wheat in the 1979/80 carryover stocks—about 15 percent more than in 1978/79.

- Government loans partially financed construction of storage facilities capable of holding 1.7 billion bushels of onfarm grain.
- There is evidence that the FOR evened out the amount of grain marketed within the marketing year by reducing early season marketings and increasing yearend marketings.
- Farmers received incentives from the Government that averaged between 35 and 50 cents per bushel per year to put corn and wheat in the FOR. Part of the incentive was in storage payments and part was in below-market interest charges on Government loans.
- Farmers who participated in the FOR tended to be younger than nonparticipating farmers. They were also more likely to operate large cash grain farms with considerably more grain storage facilities and more debt than nonparticipants. Participating farmers were also more likely to have expanded their facilities since the FOR started.

The report ends with three management aspects of the farmer-owned reserve that need attention:

- FOR objective—It would be useful if it were decided whether the objective of the FOR is to buffer stocks or to support prices.
- Storage payment levels—These payments need not be tied to storage costs; instead they should be set at levels that will induce producers to store the desired quantity.
- Program complexity—FOR's current complexity appears to add to market uncertainty, making it difficult to administer and difficult for farmers to understand.

# **An Evaluation of U.S. Grain Reserve Policy, 1977-80**

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## **Introduction**

The U.S. grain reserve policy, instituted in 1977, consisted of three components: (a) the farmer-owned reserve, (b) new rules for managing Government-owned grain stocks, and (c) an expanded program of low-interest Government loans to farmers to encourage construction of grain storage facilities. Between 1977 and 1980, the U.S. Department of Agriculture (USDA) had well over \$1 billion in unrecoverable expenditures on these features of agricultural policy. In return, the Nation had more grain stocks and more onfarm grain storage facilities. This report examines the costs and benefits of the policy over its first 3 years.

In 1977, the grain reserves issue was high on the agricultural policy agenda in the United States and in world councils. Many years of large grain stocks, primarily held in the United States, were followed in the early seventies by a series of severe crop failures worldwide. Carryover stocks around the world dropped to seriously low levels at the end of the 1974 and 1975 marketing years. During the midseventies, U.S. grain production rapidly expanded to meet an ever-expanding export market. But with bumper crops in 1975 and 1976, U.S. grain stocks once again grew to high levels. In 1977, with grain prices low and stocks large, conditions were right to start a grain reserve that would encourage holding a portion of the large grain supplies off the market for protection against future shortages. A reserve also appeared to be an effective tool for immediately raising the low grain prices.

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### Grain Reserve Description

Grains policy from 1977 to 1980 featured the farmer-owned reserve (FOR). Other policy instruments, such as the nonrecourse loans, production adjustment (set-aside and diversion), target prices, and deficiency payments played supporting roles. Farmers were encouraged to put grain in the FOR when stocks were abundant and market prices were low. Isolating reserve grain from the market reduced available quantities and caused an increase in the price. When the market price became relatively high, farmers were encouraged to remove their grain from the reserve and place it on the market to keep the price from going too high. <sup>1</sup> Stocks of grain owned by the Government's Commodity Credit Corporation (CCC), though never very large, served as a backup for the FOR. If total stocks of grain became too large, production was reduced through the cropland set-aside and diversion programs. If grain prices were low, producers received deficiency payments. For details of the grains policy of the Carter administration, see (5). <sup>2</sup>

The farmer-owned reserve included wheat, rice, corn, sorghum, barley, and oats. <sup>3</sup> Farmers who put their grain in the reserve entered into a contract with the CCC. The CCC agreed to pay the farmer a storage payment and loan the farmer money, with the grain as security at a below-market interest rate for the duration of the contract (called nonrecourse loan). The farmer agreed to store and maintain the quality of the grain in either onfarm or commercial facilities for up to 3 years.

To be eligible to participate in the FOR, the farmer had to comply with certain grain program provisions. For example, only farmers who participated in the corn production adjustment

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<sup>1</sup> Near the end of the period, the primary management objective appeared to be price support rather than the reduction of price variability. This shift is emphasis is discussed in the section "The FOR as a Policy Instrument."

<sup>2</sup> Italicized numbers in parentheses refer to items in the References section.

<sup>3</sup> The FOR is a complex program. This discussion covers only the highlights. For a more complete description of the FOR, see (1).

program (called set-aside) for 1978 and 1979 crops were eligible for the FOR in those years.<sup>4</sup> Also, at the beginning of the FOR, only grain upon which farmers had obtained a nonrecourse loan from the Government, and which had been held for the duration of the loan (less than 1 year), was eligible for the FOR. This restriction was later relaxed.

Once farmers put grain into the FOR, the grain could not be removed without penalty unless the market price exceeded a release price. When the market price was above the release price, the farmer could either repay the loan and remove the grain from the FOR or leave it in the FOR. If left in, it would no longer earn storage payments, but the farmer could retain the low-interest loan on the grain.

If the market price increased to the higher call price, the farmer was required to repay the loan within a specified time. The price parameters, interest rates, and storage payments all changed several times during the 1977-80 period. Their values as of December 1979 are in table 1. Appendix table 2 shows the price parameters during the study period.

**Table 1—Parameters for the farmer-owned corn and wheat reserve as of December 1979**

Item	Corn	Wheat
	<i>Dollars per bushel</i>	
Loan rate	2.00	2.35
Release price	2.50	3.29
Call price	2.80	4.11
Minimum CCC sales price	3.00	4.23
Annual storage payment	.25	.25
	<i>Percent</i>	
Interest on loan	9.0	9.0

<sup>4</sup> Because of the sales suspension to the USSR in January 1980, this restriction was modified for the 1979 crop.



## **Grain Storage Principles**

Farmers were required to pay interest on the reserve grain under loan only during the first year. The interest charge was waived during the second and third years. However, after the suspension of grain sales to the USSR in January 1980, the first-year interest charge for loans on corn was dropped. In December 1980, interest was waived on all grain placed in the FOR.

The CCC could also own grain. New rules for release of CCC-owned grain constituted the second component of the reserve policy. CCC-owned grain was obtained either by direct purchase or by acceptance of ownership of grain that was forfeited to the Government to fulfill farmers' obligations on the nonrecourse loans. Prior to the grain shortages of the early seventies, the CCC had held grain stocks for many years and could sell its stocks in the market at prices only slightly above the loan rate. Within the context of the new reserve management policy, the CCC-owned stocks were considered reserves of last resort and would be released to the market only after the market price had exceeded the FOR call price. The minimum CCC sales prices were set about 5 percent above the FOR call prices (table 1).

Another component of the reserves management policy was an expanded farm storage facility loan program. Although in operation since 1949, the program was redesigned to meet farm storage financing needs created by the farmer-owned reserve. Farmers who met eligibility requirements could receive a low-interest loan on up to 75 percent of the cost of the storage structure or a maximum outstanding loan balance of \$50,000 (raised to 85 percent and \$100,000 in 1980). Below-market interest rates were charged.

## **Grain Storage Principles**

A conceptual framework is needed to evaluate the first 3 years of the grain reserve. The framework used here stresses the role of the private sector in the management of U.S. grain stocks, the relationships between Government-controlled stocks and private stocks, and the important position of the United States (and U.S. farmers) in the control of the world's buffer stocks of grain.

### Buffer Stocks

The concept of buffer stocks is central to this discussion. Buffer stocks refer to speculative grain stocks that are carried over from one crop season to the next. Stocks are classified into working and speculative categories. Working stocks are used in the normal business of marketing and processing grain from producer to consumer. The quantity of grain classified as working stocks does not fluctuate much from year to year. It is determined by the efficiency and size of the transportation system, the volume of grain being processed, and many other factors. An important characteristic of working stocks is that they tend to be very unresponsive to prices and price expectations.

Speculative stocks, on the other hand, are very sensitive to prices and price expectations. They are held for speculative motives. Private firms hold such stocks because they expect to make a profit. Expected profit from storing grain is the difference between expected revenues (a future price minus the current price) and expected costs (actual storage costs and the opportunity cost of the money invested in the grain). Most of these factors are volatile; thus, the quantity of speculative stocks held is expected to change considerably from one year to the next. It is the speculative stocks, not working stocks, that buffer the grain markets by moderating the price-increasing impact of shortages and the price-depressing impact of surpluses.

For this discussion, it is important to focus on the quantity of grain stocks held just before harvest. Carryover stocks—the level of stocks at the end of a marketing year—show the cumulative effect of everyone's evaluation of the year just ended relative to their expectations of the future.

Thus, buffer stocks are speculative carryover stocks of grain. They tend to smooth out the supply of grain from year to year even though production is quite variable. Since 1977, the private sector and the U.S. Government have shared the control of buffer grain stocks. These buffer stocks are the focus of this report.

### **Farmer Ownership of Buffer Stocks**

In recent years the United States accounted for 40 percent of the world's exports of wheat and 60 percent of the world's exports of coarse grains. Also, the United States held about one-fourth of the world's wheat stocks and 40 to 50 percent of the world's coarse grain stocks. Using the concepts of speculative and working stocks, it appears that the United States held most of the world's speculative (buffer) stocks in the seventies. Most of the carryover stocks held by other countries appeared to be working stocks (3).

Farmers appear to have owned most of the buffer grain stocks in the United States during the seventies, with most of the stocks owned by nonfarm firms being hedged working stocks, and thus not very sensitive to price changes. Several recent USDA surveys support this hypothesis by showing that farmers owned most of the grain stocks in the middle of each marketing year. On January 1, 1979, about one-third of U.S. grain stocks were stored off the farm, but these off-farm stocks were mostly owned or controlled by farmers. If it is assumed that all onfarm grain is owned by farmers, then farmers owned 91 percent of the corn stocks and 81 percent of U.S. wheat stocks on January 1, 1979. The same survey the 2 previous years showed similar results (17). No survey was taken at the end of the marketing years.

This evidence implies that U.S. farmers held most of the world's buffer stocks of grain in recent years, and thus controlled most of the world's potential buffer against price-depressing surpluses and price-increasing shortages. It follows that the U.S. grain reserve policy could have a major impact on the world's year-to-year grain balances. As long as the United States constructs no grain trade barriers, a U.S. grain reserve would be a world grain reserve.

### **Economics of Speculative Grain Storage**

Economic concepts suggest that under certain conditions, a grain market composed of a large number of profit-maximizing individuals would, collectively, make socially optimal decisions about

how much of the total grain supply to consume in a current year and how much to carry over to the next crop year—that is, the private sector would carry optimal buffer stocks.

Simply put, an individual with grain storage facilities will hold grain stocks if the future price is expected to exceed the current price plus costs of holding the grain. The holding period might be for a month, or from one crop year to the next. The latter is most relevant for this discussion. If large numbers of farmers expected next year's prices to be lower than the current year's prices, they would sell their stocks in the current year. Their action would tend to lower the current year's prices and raise the next year's prices, reducing the price differential between the 2 years. Likewise, if a higher price were expected next year, the holding of grain into next year would raise the current year's prices and lower the next year's prices. The actions of a large number of competitive grain speculators (farmers) would ultimately remove all expected profits from speculation and moderate price changes between years. Competitive speculators would carry optimal stocks. Their response to economic incentives would tend to allocate grain supplies between years as desired by domestic and foreign consumers.

### **Reasons for a Grain Reserve Policy**

There are two major reasons why the U.S. Government, as a representative of all its citizens, would want to intervene in the speculative grain stock holding activity of the private sector (2, 10, 13). First, there might be imperfections in the commodity markets. Monopoly power might exist in the market such that stocks would be held at low levels and manipulated to obtain higher profits. There might also be monopoly power in the access to information about conditions that would affect the grain market in the future. Either market imperfection would cause the private sector to carry less buffer stocks than socially desirable, and Government intervention might be justified to improve market performance. Neither imperfection appears to exist. The U.S. grain storage industry has a large number of firms, there is easy entry and exit of firms, and there is easy access to information about present and expected market conditions.

The second reason for Government intervention has more validity. The market price signals (current grain prices, expected future prices, storage costs, and discount rates) may not accurately reflect social costs and benefits of holding buffer stocks. There are many reasons for the difference between private and social costs and benefits of holding grain stocks. The following are examples:

- Stockholding risks may be higher for firms in the private sector than for society as a whole;
- The discount rate may be higher for the private sector;
- Taxing storage profits may cause private benefits from stockholding to be less than the social benefits; and
- Storage costs could be less for the Government than for private firms.

The most significant divergence between private and social costs, however, appears to come from excessive grain price variability from one crop year to the next. A major cause of the unstable grain market is the structure of the foreign market faced by the United States. Many of the world's major grain producing and grain consuming nations insulate their domestic markets from the world market. Their domestic policies break the link between domestic grain prices and world prices so that consumers and producers in these nations do not respond to worldwide shortages or surpluses. In recent years, U.S. domestic grain prices were linked to world prices, thus absorbing many of the shocks to the international market that were generated in other parts of the world as well as by the United States. These shocks resulted in considerable variability in world and U.S. grain prices.

Social costs of unusually high or low grain prices are not fully internalized by the market. Examples of these social costs include:

- Longrun effects of erosion caused by temporary production of grain on fragile land when prices are unusually high;

- Political instability caused by grain price extremes;
- Macroeconomic instability and inflation due to excessive grain price fluctuation;
- Longrun effects of reducing the livestock herd when grain prices are unusually high or overexpanding when prices are unusually low;
- The effects of farm bankruptcies due to temporary but unusually low grain prices; and
- Excessive investment when producers view unusually high prices as permanent.

Many other divergences could also be listed. If the market would accurately evaluate these social costs, the private sector would tend to carry the appropriate level of grain stocks to moderate the grain price extremes.

To the extent that any of the above divergences between social and private costs were significant, there would be justification for the U.S. Government to intervene in the private business of holding stocks. Economists and politicians tend to agree that these divergences are important. Gardner sums up the economic literature on the various arguments for Government intervention in the stockholding of grain by pointing out that:

“... almost every consideration brought up suggests that the private trade stores too little. No one suggests that the private trade stores too much” (2, page 69).

Also, the strong public support in 1977 for a grain reserve was a political indication that the private trade stored too little.<sup>5</sup>

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<sup>5</sup> As mentioned above, a U.S. grain reserve is a world grain reserve. The rest of the world would be expected to receive net social benefits from a U.S. reserve. Though important, these benefits are not considered in this report. The international distribution of gains and losses from a U.S. grain reserve is discussed in (6).

## Grain Storage Principles

Since the United States is a major grain exporter, there are policies other than a grain reserve that could be used to reduce grain price variability within the United States. Exports could be restricted when grain is in short supply in order to prevent high price extremes within the United States. Low prices could be prevented by taking land out of production. But these policies may also have high social costs for the United States. Restricting production to raise grain prices when other nations are short of grain and short of foreign exchange may cause international tensions for the United States. Likewise, a grain embargo could lead to loss of export markets.

Thus, a grain reserve policy could reduce both the social costs of price variability, as well as the social costs of alternative price stabilization policies, such as production control and export embargoes.

### Costs and Benefits

The previous section presented a rationale for a Government grain reserve policy. The specific grain reserve policy used from 1977 to 1980 will now be examined using that rationale. In its simplest form, the grain reserve policy provided for an inducement to be paid to farmers to hold more buffer stocks and to build more storage facilities. The policy also allowed Government ownership of some grain stocks. Tax dollars were spent to achieve social benefits.

In order to evaluate the grain reserve policy, it is necessary to measure the costs, direct benefits, and ultimate social benefits of the policy.

**Public Expenditures.** The reserve policy involved four Government costs:

- Incentives to farmers who participated in the farmer-owned reserve (direct storage payment plus subsidized interest on loans for stored grain);
- Subsidized interest on farm storage facility loans;

- Government costs of storing Government-owned stocks; and
- Overall cost of managing the reserve policy (a minor cost relative to the others).

**Expected Direct Results.** The expected direct results from the grain reserve policy were an increase in buffer stocks of grain, including both privately owned and Government-owned grain, some control over when the stocks were used, and expanded onfarm storage facilities. The increase in buffer stocks specifically refers to the quantity of stocks remaining at the end of the marketing year.

**Expected Social Benefits.** Expected social benefits would include increased efficiency, more political and macroeconomic stability, better use of fragile lands, better international relations, and reduced threat of an embargo. These are nearly impossible to quantitatively measure. A more easily measured proxy for these social benefits would be the reduction in grain price variability resulting from the grain reserve policy. Reduced price variability is expected to be directly related to reduced social costs.

In addition, the grain reserve policy, like any public policy, leads to a redistribution of welfare. Some people gain, others lose.

**The Data.** Data are available from 1977 through 1980 on the grain reserve policy. Unfortunately, this period includes only three observations of U.S. season-ending buffer stocks for each type of grain in reserve—too few observations for a comprehensive analysis of the policy. More years of observation are needed to tell if the net social benefits are positive, or if the size of the reserve should be changed. On the other hand, information is available on the direct costs and direct results of the policy. Also, data are available on the impact of the reserve policy on grain price variability. Some information is also available on who participated in the FOR.



### Grain Reserve Performance

Between 1977, the time when the FOR originated, and January 1, 1981, there have been six types of grain in the FOR. Most of the reserve stocks consisted of corn and wheat, but there also were reserve stocks of oats, grain sorghum, barley, and a very small quantity of rice (table 2). There have been occasional periods of both grain accumulation in the reserve and grain release. This section focuses upon the reserve for corn and wheat, the crops accounting for most of the reserve.

### Public Costs

To carry out the grain reserve policy, the Government induced a marginal reallocation of the Nation's resources by paying incentives to farmers to store additional grain and build additional grain storage and drying facilities. The Government also purchased the services of private grain storage and transportation facilities to store and transport Government-owned grain. The market value of these incentives and purchased services was \$1.2

**Table 2—Total quantity of grain entered into the FOR, 1977 to January 1, 1981, and the quantity remaining in the FOR, January 1, 1981**

Grain	Total grain entered from 1977 to Jan. 1, 1981	Net grain remaining on Jan. 1, 1981
<i>Million bushels</i>		
Corn	<sup>1</sup> 1,260	1703
Wheat	501	228
Oats	49	3
Sorghum	106	5
Barley	51	11

<sup>1</sup> An additional 270 million bushels of corn were added in January 1981.

Sources: (14, 15).

billion for the corn and wheat reserve over the 3 years examined (table 3). <sup>6</sup>

Since its beginning, the FOR has accounted for 70 percent of the total cost of the grain reserve policy. Over the first 3 marketing years, Government storage payments to farmers were about \$360 million for corn in the FOR and \$150 million for wheat. Corn payments were higher because of the larger volume of corn in the reserve.

Participating farmers also received a substantial interest subsidy. If it is assumed that the farmer's opportunity cost of interest is the rate charged by the Production Credit Association (PCA), then the interest subsidy over the same 3 marketing years was \$240 million for corn and \$112 million for wheat. Thus, the total 3-year incentive was \$600 million for corn and \$262 million for wheat (see table 3).

The costs associated with CCC ownership of wheat and corn stocks over the 3-year period were \$210 million for storage and transportation and \$120 million for the interest charge on the funds invested in the grain. The market value of the grain increased over the period, but that is counted as a social benefit.

The least costly component of the grain reserve policy was the interest subsidy on farm storage facility loans, being less than 3 percent of total costs (see table 3). By borrowing from the Government, rather than using other private sources, the loan recipients received an interest subsidy of about \$31 million for wheat and corn storage facilities.

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<sup>6</sup> The market value is somewhat higher than the Federal budget cost. Consider a hypothetical example. A farmer puts 100 bushels of corn in the FOR and receives an interest-free loan of \$210 from the CCC plus a storage payment of \$26.50. One year later the farmer removes the corn from the FOR and repays the loan. Suppose the interest rate on short-term capital is 12 percent if borrowed commercially, and 10 percent if borrowed from the Federal Government. The value of the benefits received by the farmer for participating are \$26.50 plus an interest subsidy of \$25.20, for a total of \$51.70. The cost to the CCC (and the Federal budget) is \$26.50 plus \$21, the cost of borrowing the money through the U.S. Treasury. The CCC cost of \$47.50 is less than the value of the FOR to the farmer by the difference in the interest charge.

**Table 3—Estimated public costs of the U.S. grain reserve policy for wheat and corn, fiscal 1978-80**

Item	3-year costs		
	Corn	Wheat	Total
<i>Million dollars</i>			
Farmer-owned reserve:			
Storage payment <sup>1</sup>	360	<sup>2</sup> 150	510
Interest subsidy <sup>3</sup>	240	<sup>2</sup> 112	352
Total	600	<sup>2</sup> 262	862
CCC-owned stocks:			
Storage and transportation <sup>4</sup>	126	84	210
Interest charge <sup>5</sup>	70	50	120
Total <sup>6</sup>	196	134	330
Interest subsidy on farm storage facility loans <sup>7</sup>	25	6	31
Total	821	402	1,223

<sup>1</sup> Net payment after deduction of overpayments to farmers.

<sup>2</sup> Computed for the wheat market years from June 1, 1977, to May 30, 1980.

<sup>3</sup> Difference between interest rate charged the farmer by the Government and the market rate of interest (Production Credit Association) on the commodity loan for grain in the reserve.

<sup>4</sup> Obtained from Agricultural Stabilization and Conservation Service.

<sup>5</sup> Estimated market cost of money invested in CCC-owned stocks.

<sup>6</sup> Does not include change in market value of the grain.

<sup>7</sup> Interest subsidy on farm storage facility loans is assumed to be 1.4 percent in fiscal 1978 and 1979 and 1.0 percent in fiscal 1980. It is further assumed that 63 percent of the facility loans are for feed grain storage and 15 percent for wheat storage.

### The Farmer-owned Reserve<sup>7</sup>

During the first 3 marketing years, farmers received over \$800 million in direct and indirect incentives for participating in the wheat and corn reserve. The most direct and visible product obtained for the \$800 million was the quantity of grain in the reserve.

<sup>7</sup> For another evaluation of the FOR, see (18).

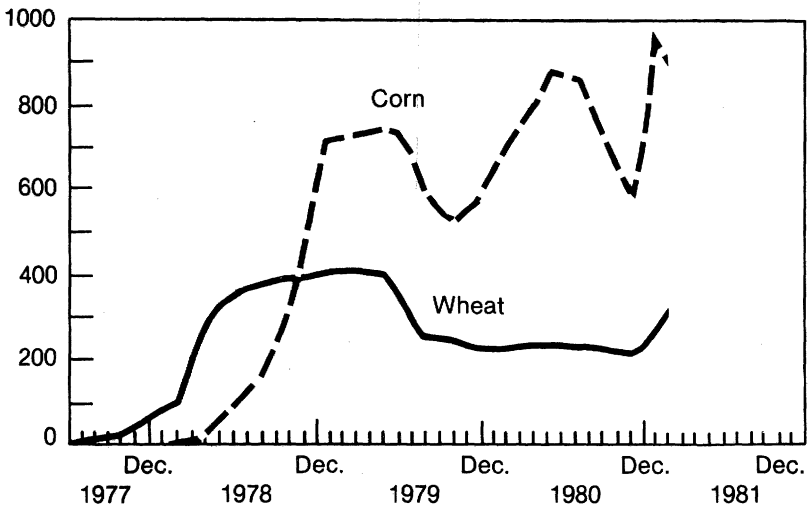
**Corn in the FOR.** From 1978 to 1980, there were three periods of corn accumulation in the FOR and two periods of release (fig. 1). Only a small quantity of corn was placed in the FOR prior to May 1978. In May, however, farmers were allowed to put their corn directly into the FOR without waiting until the expiration of their nonrecourse loan. Placements increased rapidly for the next 9 months. In January 1979, over 700 million bushels had accumulated in the FOR, consisting mostly of 1977-crop grain, but with some 1978-crop grain. Corn prices increased during the first 5 months of 1979 and reserve placements slowed. The corn reserve remained about constant from January to June while it essentially was closed to new placements.

In June 1979, the market price exceeded the release price, allowing farmers to pay off their loans and remove their corn

Figure 1

### Quantity of Wheat and Corn in the Farmer-Owned Reserve

Mil. bu.



from the FOR without penalty. About one-fourth of the corn reserve was released over the next 4 months.

With the harvest of the 1979 crop, the corn price fell and release was terminated in November. Corn again entered the FOR. The corn reserve grew rapidly after the January 1980 suspension of exports to the USSR. Deteriorating 1980 crop prospects in the United States, strong exports, and a large quantity of corn placed in the FOR put upward pressure on prices. In July 1980, corn again was released from the FOR. From October 1979 to July 1980 the corn reserve grew by 323 million bushels, or nearly 60 percent (see fig. 1).

As in the previous year, corn was released from the FOR from midsummer until after harvest. The reserve decreased by 280 million bushels. In December 1980 and January 1981, however, the corn stocks in the FOR increased 370 million bushels, even though the price was above the release price and storage payments had stopped. The incentive was provided by the availability of "no interest" nonrecourse loans.

**Wheat in the FOR.** The pattern of increase and decrease of FOR stocks of wheat differs from that of corn (see fig. 1). There was an initial period of wheat accumulation and one period of release during the 3 years.

Wheat stocks first entered the FOR in the spring of 1977 but little had accumulated by February 1978. In March, farmers were allowed direct entry into the wheat reserve, the storage payment was raised to 25 cents, and the interest charge was dropped on the second and third years of the 3-year reserve contract. These additional incentives apparently were effective since the wheat reserve increased 143 million bushels during the next 3 months. From September 1978 to May 1979, very little wheat was added. In May, the wheat price exceeded the release price and farmers could withdraw wheat from the reserve. At that time, the reserve contained slightly more than 400 million bushels with about half coming from each of the 1976 and 1977 crops, but none from the 1978 crop. By the end of the 1978 marketing year for wheat (May 31, 1979), 44 percent of U.S. wheat stocks were in the FOR.

From May 1979 until January 1980, the market price stayed above the release price. The FOR decreased by nearly half to 222 million bushels during that time (see fig. 1).

After the suspension of exports to the USSR, there was little change in FOR wheat stocks. Stocks of FOR wheat obtained from the 1976 and 1977 crops declined, while stocks from the 1978, 1979, and 1980 crops increased. On January 1, 1981, about two-thirds of the FOR wheat stocks were from the first 2 crop years, and one-third was from the last 3 crop years.

**FOR Participation by Region.** There were major differences in participation in the farmer-owned reserve among producing regions of the United States. There was heavy participation in the wheat reserve in the wheat-producing Plains States. Those States had 93 percent of the Nation's FOR wheat stocks when the reserve volume peaked in May 1979, even though they accounted for only 68 percent of total U.S. wheat production (table 4). The eastern Corn Belt and the Pacific Northwest were also significant wheat-producing regions, but they had few FOR wheat stocks.

Between June 1 and October 12, 1979, farmers removed 165 million bushels (40 percent) of wheat from the FOR. This wheat was removed from the reserve in regions where a high proportion of the wheat stocks were stored off the farm. In the northern Plains, where over 80 percent of the wheat stocks were stored on the farm on June 1, 1979, only 23 percent of FOR wheat stocks were released (see table 4). In all other wheat-producing regions a much smaller proportion was stored on the farm and a much higher proportion of their FOR stocks were released.

Most reserve stocks of corn were located in the Plains States and the Corn Belt (table 5). In May 1979, when the FOR corn stocks reached the first peak, 94 percent were located in the Plains States and the eastern Corn Belt. The Corn Belt held much of the FOR stocks of corn, as expected, but while it accounted for over half of the U.S. corn production, it held only 36 percent of the May 1979 FOR corn stocks. On the other hand, the Plains States, which accounted for only 28 percent of the Nation's corn production, had 58 percent of the May 1979 FOR stocks of corn.

In fact, by the end of the 1978/79 corn marketing year, over half of the corn stocks in the Plains were in the reserve.

When corn was released from the reserve between May and October 1979, the regional pattern of release was similar to wheat. Little was released in the northern Plains where a high percentage of the region's stocks were stored on the farm. More was released in the eastern Corn Belt and the central and southern Plains where stocks tended to be stored off the farm. The Lake States did not follow this pattern, however. They stored most of their stocks on the farm, but still released a high percentage of their FOR corn stocks at the first opportunity.

**Table 4—Regional characteristics associated with the farmer-owned reserve of wheat <sup>1</sup>**

Item	Central and southern Plains	Northern Plains	Eastern Corn Belt	Pacific North- west
	<i>Percent</i>			
Region's portion of national:				
Wheat production, 1977 and 1978 crops	37	31	11	12
Wheat stocks, June 1, 1979	36	48	2	9
Wheat FOR stocks, June 1, 1979	42	51	1	4
Portion of region's wheat stocks stored on the farm, June 1, 1979	27	82	20	25
Portion of region's wheat stocks in the FOR, June 1, 1979	52	48	14	23
Portion of region's FOR wheat stocks released by October 12, 1979	58	23	67	58

<sup>1</sup> Regions include the following States: Central and southern Plains—Colorado, Nebraska, Kansas, Oklahoma, and Texas; northern Plains—North Dakota, South Dakota, Montana, and Minnesota; eastern Corn Belt—Ohio, Indiana, Illinois, and Missouri; Pacific Northwest—Idaho, Oregon, and Washington.

**Table 5—Regional characteristics associated with the farmer-owned reserve of corn <sup>1</sup>**

Item	Eastern Corn Belt	Northern Plains	Central and southern Plains	Lake States
	<i>Percent</i>			
Region's portion of national: Corn production, 1977 and 1978 crops	54	12	16	7
Corn stocks, October 1, 1979	40	24	25	6
Corn FOR stocks, May 1979	36	24	34	5
Portion of region's corn stocks stored on the farm, October 1, 1979	53	73	56	78
Portion of region's corn stocks in the FOR, October 1, 1979	34	51	56	29
Portion of region's FOR corn stocks released by October 1, 1979	34	12	28	35

<sup>1</sup> Regions are as defined for table 4. Lake States include Michigan and Wisconsin.

**Farmer Participation.** Participants in the farmer-owned reserve, compared with all farmers, tended to be younger, farm many more crop acres, have grain as a main enterprise rather than livestock, have a much larger investment in grain storage facilities, and have recently added storage facilities.

These results came from a survey of farmers conducted during the summer of 1979 (9). The survey data

“... paint an image of participants as large, well-equipped, aggressive farm operators, rather specialized in crop production and using the reserve and other government programs for risk management and income support”(9).



The survey indicated that those who had grain in the reserve had nearly as many free stocks (that is, stocks owned by the farmer but not in the reserve) relative to their production as did the non-participants. This might indicate that "... reserve participants do not view reserve grain as a substitute for normal inventory activities" (9).

The inducement (storage payment plus below-market interest) to farmers to participate in the FOR varied considerably since the program started in 1977. For example, in 1978 when farmers were putting large quantities of corn into the FOR, the storage payment was 25 cents per bushel per year. The farmer was charged 6-percent interest on the loan of \$2 per bushel. A farmer who borrowed the \$2 from the PCA would have paid between 8.5 and 9 percent. The reduced interest was worth about 5 to 6 cents per bushel per year. Thus, the total incentive, including storage, was 30 to 31 cents. If the corn was kept in the FOR a second year, no interest was charged on the loan. The combined storage plus interest incentive would then be worth 25 cents plus 18 cents, or 43 cents per bushel per year.

In early 1980, the storage payment was raised to 26.5 cents and the interest charge for the first year of the loan was dropped. With PCA interest rates of 12 to 14 percent, the combined incentive was between 50 and 55 cents per bushel per year. In December 1980, the corn price exceeded the release price and no storage payments were made. Farmers still put grain in the reserve because the interest subsidy on the corn loan was nearly 30 cents per bushel per year.

**Effect of Reserve Policy Increases Buffer Stocks.** The importance of Government reserve policy in increasing the total buffer stocks (private plus public stocks) of grain carried over from one marketing year to the next has already been stressed. The impact of the FOR on carryover stocks was observed for 3 marketing years, 1977/78, 1978/79, and 1979/80 (tables 6 and 7). The carryover stocks in the corn reserve grew each year from 234 million bushels in 1977/78 to 729 million bushels in 1979/80. The wheat reserve peaked at 403 million bushels at the end of 1978/79, and then decreased.

**Table 6—The farmer-owned reserve corn and wheat stock levels and costs by marketing year, 1977/78 to 1979/80**

Item	Marketing year <sup>1</sup>			Sum
	1977/78	1978/79	1979/80	
<i>Million dollars</i>				
Corn:				
Storage payments <sup>2</sup>	14	159	187	360
Interest subsidy <sup>3</sup>	3	61	176	240
Total	17	220	363	600
<i>Million bushels</i>				
Corn in FOR at yearend	234	550	729	—
Increase in corn stocks: <sup>4</sup>				
0.7 bushels <sup>4</sup>	164	385	510	—
0.4 bushels <sup>4</sup>	94	220	292	—
<i>Dollars</i>				
Total cost per bushel:				
Total FOR-corn	.07	.40	.50	—
0.7 × FOR-corn	.10	.57	.71	—
0.4 × FOR-corn	.18	1.00	1.24	—
<i>Million dollars</i>				
Wheat:				
Storage payments <sup>2</sup>	23	95	32	150
Interest subsidy <sup>3</sup>	5	48	59	112
Total	28	143	91	262
<i>Million bushels</i>				
Wheat in FOR at yearend	343	403	232	—
Increase in wheat stocks: <sup>4</sup>				
0.7 bushels <sup>4</sup>	240	282	162	—
0.4 bushels <sup>4</sup>	137	161	93	—
<i>Dollars</i>				
Total cost per bushel:				
Total FOR-wheat	.08	.35	.39	—
0.7 × FOR-wheat	.12	.51	.56	—
0.4 × FOR-wheat	.20	.89	.98	—

— = Not applicable.

<sup>1</sup> Starts October 1 for corn and June 1 for wheat.<sup>2</sup> Estimated by use of monthly ASCS statistics on grain in the FOR.<sup>3</sup> Difference between PCA interest rate and rate charged farmer for the commodity loan.<sup>4</sup> Alternative assumptions are made about how much total stocks are increased by the FOR. For example, the 0.7 assumption says that for each bushel in the FOR, total stocks are increased by 0.7 bushel.

Analysts agree that total grain stocks carried over at the end of each marketing year increased less than by the total amount of grain in the FOR. A bushel in the FOR is expected to increase total stocks by less than 1 bushel. There are two main reasons for this. First, some grain in the FOR would have been stored by farmers even if no FOR existed. They could put grain in the FOR and get paid for what they intended to do anyway. Second, as grain accumulates in the FOR, it lowers farmers' expectations of future prices. With lower price expectations, less will be stored.

**Table 7—Yearend stocks of wheat and corn, 1976/77 to 1979/80**

Item	1976/77	1977/78	1978/79	1979/80
<i>Million bushels</i>				
Wheat: <sup>1</sup>				
Privately owned—				
In FOR	0	343	403	237
Not in FOR	1,113	789	471	523
Total	1,113	1,132	874	760
Government-owned	0	46	50	142
Total	1,113	1,178	924	902
Total reserves <sup>2</sup>	0	389	453	379
<i>Dollars</i>				
Season average price	2.73	2.33	2.97	3.78
<i>Million bushels</i>				
Corn: <sup>1</sup>				
Privately owned—				
In FOR	0	234	550	729
Not in FOR	886	864	654	632
Total	886	1,098	1,204	1,361
Government-owned	0	13	100	256
Total	886	1,111	1,304	1,617
Total reserves <sup>2</sup>	0	247	650	985
<i>Dollars</i>				
Season average price	2.15	2.02	2.25	2.52

<sup>1</sup> Marketing year begins June 1 for wheat and October 1 for corn.

<sup>2</sup> Sum of Government-owned and FOR stocks.

Sources: USDA's ASCS and ESS, February 1981.

Analysts do not agree, however, on how much total stocks increased with the addition of 1 bushel to the FOR. Estimates range from 0.2 to 0.9 bushel. Too little data are available to have much confidence in any estimate. For purposes of this analysis, two assumptions are made; a 1-bushel increase in FOR stocks increases total stocks either 0.7 or 0.4 bushel. The former suggests a more cost-effective reserve than the latter (that is, more stocks per subsidy dollar). Evidence indicates that the true value is probably nearer 0.4.<sup>8</sup> Using the 0.7-bushel assumption, the FOR increased corn buffer stocks at the end of the 1979/80 marketing year by 510 million bushels, and with the 0.4-bushel assumption, the increase was 292 million bushels (see table 6). Similar computations for the other 2 years, and for the 3 years for wheat, are shown in table 6.

If the main objective of the reserve policy is to increase carryover stocks, then it is appropriate to view the costs of operating the reserve throughout the year as costs of accumulating the carryover stocks. Total annual costs divided by the quantity of carryover stocks in the reserve gives the average cost per bushel of reserve carryover stocks. The average incentive received by FOR participants (storage payment and interest subsidy) per bushel of carryover stocks in the FOR changed substantially from one year to the next. For corn, the incentive was only 7 cents per bushel in 1977/78. The incentive was low because corn was in the reserve only a few months rather than all year, the storage payment and interest subsidy were relatively low, and large quantities of corn entered the reserve because of the low corn price. The total incentive for carryover stocks of FOR-corn increased to 40 cents in 1978/79 and 50 cents in 1979/80 (see table 6). The higher incentives reflect carrying charges for the whole year and higher interest subsidies, since loan interest no longer was charged.

The incentive provided per bushel of carryover wheat stocks in the FOR (35 cents in 1978/79 and 39 cents in 1979/80) was less than that for corn. Wheat was in release status more often, and contrary to corn, interest was not waived on the first year in the reserve.

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<sup>8</sup> See (18, volume II).

The incentive per bushel added to total buffer stocks was considerably higher. Though the average annual incentive per bushel of corn in the FOR at the end of 1979/80 was 50 cents, the incentive per bushel added to corn stocks by the FOR was 71 cents (if 0.7-bushel substitution is assumed) or \$1.24 (if 0.4-bushel substitution is assumed). Costs per bushel added to stocks were lower for corn the previous 2 years (see table 6). Wheat reserve costs were somewhat lower than for corn.

### CCC-owned Stocks

The U.S. Government did not own grain stocks from 1972 until the end of the 1977/78 marketing year. Small quantities of Government-owned corn and wheat stocks accumulated during 1977/78 and 1978/79 (see table 7). More would have accumulated had it not been for the farmer-owned reserve. One of the objectives of the FOR was to divert stocks into the FOR rather than have them end up under Government ownership. Government-owned stocks further increased in 1979/80 as a result of actions taken to support grain prices after the January 1980 sales suspension to the USSR. These stocks could not be made available to the market until the market price exceeded at least 180 percent of the wheat loan rate and 150 percent of the corn loan rate. Prices did not reach those levels.

The annual storage, handling, transportation, and interest charges associated with the CCC-owned grain averaged 56 cents per bushel of corn and 63 cents per bushel of wheat in the ending 1979/80 inventory. Costs per bushel were about 15 percent lower in 1978/79.

Economic analysts also believe that total buffer stocks increased by less than 1 bushel when a bushel was added to the CCC-owned inventory. For the 3 years examined, however, the ratio of change in total stocks to change in CCC-owned stocks probably was only slightly below 1 to 1. The reasons the ratio might be higher than for FOR stocks are that the CCC-owned stocks were more insulated from the market, and the quantities were small. No empirical estimate of the ratio is available.

## Grain Storage Facility Loans

Government loans were obtained by farmers to help finance the construction of 1.7 billion bushels of onfarm storage space during the fiscal years 1978 to 1980 (table 8). As a comparison, on January 1, 1980, 7.6 billion bushels of wheat, feed grains, and soybeans were stored on the farm. Thus, the added storage space was significant. New loans of \$1.7 billion were made those 3 years, but some of the funds were used for storage of hay and silage.

Some of the storage facilities would have been built even without subsidized loans. However, the program likely increased construction over what would have happened without the program. Once the facilities are built, more stocks will be stored because thereafter only variable costs need to be covered. Thus, the facility loan program is expected to increase the quantity of buffer stocks.

## Price Variability

Since many of the social benefits expected from a grain reserve are very difficult to measure, the variability of grain prices is

**Table 8—Farm storage facility loans made by  
Commodity Credit Corporation**

Fiscal year	New loans <sup>1</sup>	Added storage capacity
	<i>Million dollars</i>	<i>Million bushels</i>
Average 1973-77	99	163
1978	646	754
1979	679	685
1980	363	292
3-year sum	1,688	1,731

<sup>1</sup> Includes funds for storage of hay and silage as well as grain. In fiscal 1980, 85 percent of the loaned funds were for grain storage and drying facilities.

Source: ASCS.

used instead. A reduction in variability is expected to be associated with increased social benefits. Price variability may be examined by either between-year variability (among season average prices) or within-year variability.

**Between-year Price Variability.** As discussed previously, a properly functioning grain reserve program puts grain in reserve during abundant years and releases grain during lean years. Does the combined reserve (FOR and CCC-owned stocks) do this? The data needed to analyze this question are season average prices (a measure of the extent to which grain throughout a marketing year is "abundant" or "lean") and yearend reserve stocks. There are only 3 years of observations, so the evidence is not very substantial.

Yearend corn reserves increased each of the 3 years of the new reserve policy. By the end of 1979/80, there were 985 million bushels of corn in reserve (729 million in the FOR and 256 million owned by the CCC), which represented 60 percent of total stocks. During those 3 years, the price of corn increased (see table 7 and fig. 2), but the increase could be due to inflation and growing demand as well as to the accumulation of reserve stocks. Meyers and Ryan estimate that the new reserve policies raised the average corn price from 11 to 17 cents per year over the last 2 years, with a smaller price increase the first year. They also estimate that by the end of 1980/81, the new reserve policies would increase total stocks of corn 250 to 300 million bushels over what otherwise would be a very low carryover level. Thus, their results indicate that the reserve policy raised prices when corn was abundant and provided more stocks to be carried into a year that could have shorter supplies and higher prices (8).

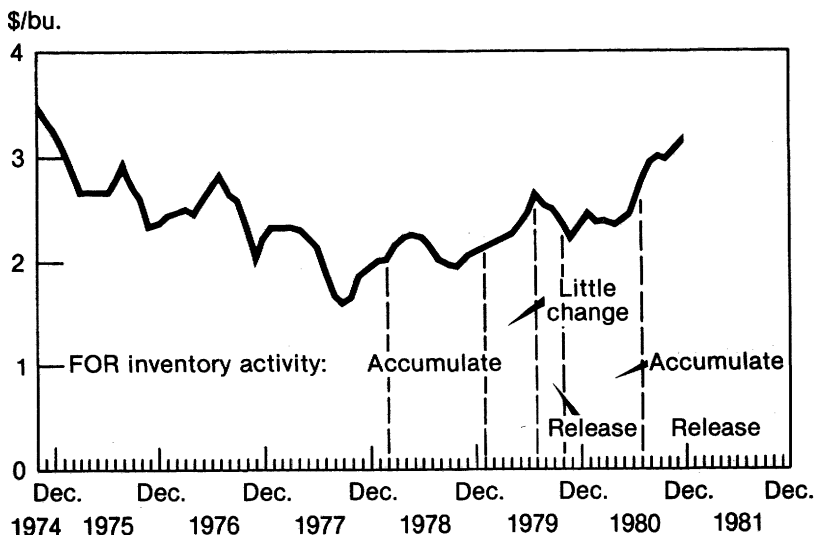
Yearend wheat reserves substantially increased in 1977/78, modestly increased in 1978/79, and modestly decreased in 1979/80 (see table 7). As with corn, the price of wheat increased after the reserve was established in 1977, following a 2-year price decline (fig. 3). Sharples and Holland estimate that the new reserve policy increased the season average wheat price by 8 cents in 1977/78 and from 20 to 54 cents in 1978/79, depending upon the assumed substitution of FOR stocks for other privately owned stocks (12).

Meyers and Ryan estimate a positive price impact of 28 cents in 1978/79 and from 21 to 48 cents in 1979/80 (8). The price impact is small in 1977/78 because without the FOR, the market price would be supported by the loan rate (8 cents below the actual 1977/78 price). The next 2 years the price impact is larger and positive even though the change in yearend reserve stocks is quite small because none of the reserve grain could be released until the market price exceeded the release price.

The research by Meyers and Ryan, and Sharples and Holland indicate that the reserve had a positive impact on price during the years of net accumulation of stocks (8, 12). The size of the price impact depends upon the assumed degree of substitution of reserve stocks for other stocks held by private stockholders. The 3 years of experience do not include a year when there was a substantial decline in carryover stocks in the FOR. A research report by Sharples, however, examined the impact of the wheat

Figure 2

### Corn Price Received by Farmers and FOR Activity





reserve policy on many simulated years—some with a net accumulation and some with a net drawdown of reserves (10). The study compared the impact of the post-1977 reserve policies on the wheat market with the impact of the pre-1977 policies over many market conditions. Results showed that the post-1977 reserve policy was capable of reducing price variability and reducing the probability of high or low extremes in grain prices.

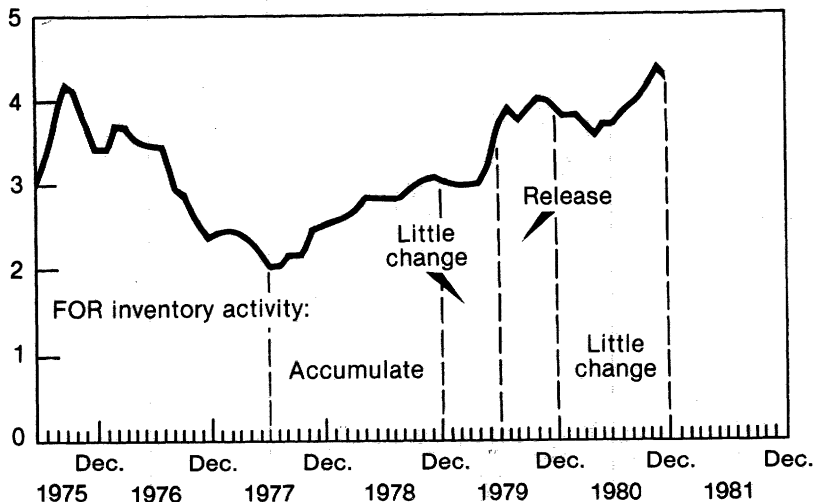
To summarize, the meager data and analyses available provide evidence that the grain reserve policy reduces between-year price variability.

**Within-year Variability.** Although a major function of a grain reserve is to modify shortages and surpluses from one marketing year to the next, along with the associated price variability, it also may modify marketing patterns and prices within the marketing year. The impact of the reserve policy on within-year price variability, however, is not a major criterion upon which to evaluate a

Figure 3

### Wheat Price Received by Farmers and FOR Activity

\$/bu.



reserve policy. Other policy instruments could be used for that objective, such as the traditional nonrecourse loan program.

The plots of monthly prices (see fig. 2 and 3) for years prior to, and during, the reserve policy show little evidence of reduced price variability during the reserve policy. But there is some evidence that the reserve policy tends to smooth out the quantity marketed over the year. During the 4 marketing years prior to the reserve policy, 13.5 percent of the year's wheat use disappeared in the last 2 months. During the reserve years, 16.2 percent disappeared the last 2 months (table 9). The last 4 months of the corn marketing year accounted for 24.6 percent of corn disappearance without the reserve and 27.5 percent with the reserve. Other things equal, the shift toward a more uniform marketing of grain over the year would tend to reduce the usual seasonal price differential between the low prices at harvest and high prices at the end of the marketing year.

**Table 9—Wheat and corn disappearance by periods of the year, 1973/74 to 1980/81**

Periods	1973/74 to 1976/77	1977/78 to 1980/81 <sup>1</sup>
	<i>Percent</i>	
Wheat:		
Period 1 (June-Sept)	37.5	37.0
Period 2 (Oct-Dec)	26.0	24.0
Period 3 (Jan-Mar)	23.0	22.8
Period 4 (Apr-May)	13.5	16.2
Year total	100.0	100.0
Corn:		
Period 1 (Oct-Dec)	31.2	29.8
Period 2 (Jan-Mar)	28.2	26.2
Period 3 (Apr-May)	16.0	16.5
Period 4 (Jun-Sept)	24.6	27.5
Year total	100.0	100.0

<sup>1</sup> For wheat, percentage was estimated for the last two periods of 1980/81.

### Costs and Benefits

During the 3 years studied, \$1.2 billion was spent to promote a shift of resources from other uses to the expansion of grain reserves. No attempt was made to estimate the amount of additional capital and labor that invested in holding more stocks and building more facilities. An attempt was made, however, to measure the impact of the shift of resources.

The evidence indicates that in return for the \$1.2 billion, the United States obtained:

- More buffer stocks. The exact quantity of buffer stocks added by the grain reserve policy is not known. It depends upon how much nonreserve stocks diminish when the reserve stocks increase. By the end of the 1979/80 marketing year, the reserve policy had increased wheat stocks roughly 25 to 45 percent. The increase in corn stocks was even higher.
- More storage facilities. The construction of storage facilities to handle 1.7 billion bushels of grain was partially financed by the facility loan program. Some of that capacity may not have been built without that program.
- More Government control of part of the Nation's buffer stock. The Government made the rules and controlled the incentives for the FOR. The Government controlled the CCC-owned stocks.
- Higher grain prices during the 3-year study period. There was a net accumulation of FOR and CCC-owned grain stocks during these years. The buildup raised grain prices, but the magnitude of the price increase is in doubt and depends upon how much the reserve policy increased total buffer stocks. Grain prices would be expected to dip when the reserve stocks are released.

It is not obvious from the 3-year observations whether the American people got their money's worth from the FOR. A longer period of time is needed for a comprehensive analysis of

the grain reserve policy. Though there were some ups and downs in the quantity of stocks in the reserve those 3 years, they were primarily years of reserve stock accumulation. Consequently, one would expect, as was verified by the data, the period to be long on startup costs and somewhat short on benefits.

The grain reserve policy appears to have the potential to reduce year-to-year grain price variability. As previously discussed, there are many social benefits derived from that reduction. Unfortunately, they are very difficult to measure.

Direct recipients of the grain policy subsidies tend to be operators of large grain farms and owners of storage facilities. They were subsidized to provide additional services desired by society. All producers received the price-increasing benefits when the reserve was being filled. They will all suffer the price-depressing impacts when the reserve is being released. Some producers could gain from the reduced price variability; others could lose.

Although research suggests that U.S. stock management objectives are better served when the Government has some control of the buffer stocks, there is the possibility that the Government might use its control over stocks to achieve other shortrun objectives that are not consistent with longer run buffer stock objectives.

## **Other Issues**

The debate over changes that should be made in the FOR concerns several important issues. Three of those issues are discussed here.

### **The FOR as a Policy Instrument**

Two concepts of how the FOR should be managed have developed since 1977. One views the FOR primarily as a buffer stock; the other views the FOR primarily as a mechanism for supporting the market price. These two concepts imply major differences in how the FOR release price (and call price) is administered.

**FOR as a Buffer Stock.** Those who hold the buffer stock concept, view the FOR as a policy instrument primarily aimed at reducing market price variability. As a buffer stock, the FOR would be used to defend a market price corridor. The floor of the corridor would be the loan rate and the top of the corridor would be the FOR release price. The buffer stock management strategy would have the market price fall within the corridor most of the time. When the price dropped near the loan rate, grain would be put into the FOR. When the market price exceeded the release price, reserve grain would enter the market. These actions would moderate the price extremes.

To carry out this concept, the release price would need to be set above the market price expected under normal market conditions. If the normal price was trending upward, as was the case after 1977, the release price would need to be adjusted upward to maintain its relative position to the normal price. Procedures used for adjusting the release price would need to be sensitive both to changing supply conditions (mainly the changing cost of production) and changing demand conditions (mainly export demand). For example, if demand decreased over time, the release price might need to be adjusted downward. The incentives to producers (storage payments and low-interest loans) would need to be managed so as to encourage participation when the market price was low and encourage release of grain when the market price went above the release price.

When managed as a buffer stock, the FOR would provide price support only to the extent that the market price would be increased when grain was put into the FOR. The market price would be expected to be below the release price most of the time.

**FOR as a Price Support Instrument.** Others have viewed the FOR primarily as an instrument to support the price of grain, that is, to prevent the market price from falling below a specified level. The reserve objective is secondary. This view holds that the FOR should be managed so that the market price is supported at the release price. The FOR incentives (storage payment and low-interest loans) should be used to encourage farmers to put

their grain into the FOR when the market price is near or below the release price. The price could be held at or above the release price when the reserve removes sufficient grain from the market.

When used as a price support, the FOR's release price would be defined in terms of price-support objectives rather than in terms of buffer stock objectives. Historically, price support has been linked to parity and, more recently, to the cost of production. As a price support, the release price might be defined by the variable costs of grain production on a typical farm. It would not likely be set in the same relationship to the normal market price as it would be if the FOR were conceived primarily as a buffer stock.

If the market price usually exceeded the release price, then it would not be difficult to meet the price-support objective. If, however, the market price needed to have continued support, then additional grain would have to accumulate in the FOR. Stocks could grow indefinitely. The only way to hold down stock levels would be to use Government production controls, such as set-aside or diversion of cropland, as was done in the sixties when stocks grew and land was taken out of production. With the FOR, however, farmers, rather than the Government, would own the excess stocks.

If the market price usually had to be supported at the release price, there would be substantial price stability—as in the sixties—but at a substantial cost to the Government in storage incentives and production adjustment costs. If the market price usually exceeded the release price, then the FOR would not need to contain very much grain in order to support the market price. But there would be no buffer stock. So an important issue is whether or not farmers would receive incentives to keep their grain in the FOR when the market price exceeded the FOR release price. If not, the FOR would be a little-used program—used only now and then to support the price. If incentives continued (as was the case in 1977-80 with no-interest commodity loans) then the FOR would encourage the holding of additional stocks even when the price exceeded release.

**Summary.** To clarify the policy debate on the FOR, it is important to identify the major objective of the FOR. Once it is clear whether the FOR is to be a buffer stock or a price support, it will be easier to address the questions of where to set the release price (and call price), what factors to consider when adjusting the release price over time, what limits to place on the size of the FOR, and how to manage the incentives to participants.

### Storage Payments and Costs

There has been some concern that the storage payment per bushel of grain placed in the FOR exceeds the cost of storage for much of the grain. Critics point out that the 1980 variable costs of storage of grain on farms was considerably below the 26-1/2 cents per bushel per year FOR storage payment rate in 1980 (18). The implication is that there should be a direct relationship between the Government payment and the cost of storage. This connection is stated in the Food and Agricultural Act of 1977. It states that the Secretary shall make:

“... payments to producers of such amounts as the Secretary determines appropriate to cover the costs of storing wheat and feed grains held under the programs.”

Within the economic logic of a grain reserve, however, there need not be a direct relationship between the FOR storage payment and the cost of storing grain. The most obvious reason is that the farmer who participates in the FOR receives sizable benefits from the low-interest commodity loan as well as the storage payment. But these combined benefits of participation also need not be directly related to storage costs. An efficient farmer-owned grain reserve would be one where the storage incentive (that is, storage payment plus value of the low interest on the loan) would be just high enough to obtain the desired quantity of stocks in the FOR. The expected relationship between the storage incentive and FOR stocks is shown in figure 4. Suppose the Government wanted to have farmers put the quantity S in the FOR. A subsidy of P would need to be offered. A higher incentive would induce more grain into the FOR, and a smaller incentive would induce less.

The cost of storage would be only one of many factors a farmer would consider when evaluating participation in the FOR. Other factors would be:

- Future grain price expectations;
- The risk-bearing ability of the farmer, the opportunity cost of the farmer's capital;
- The time and effort required to participate in the FOR; and
- Partial loss of control over when the grain may be sold.

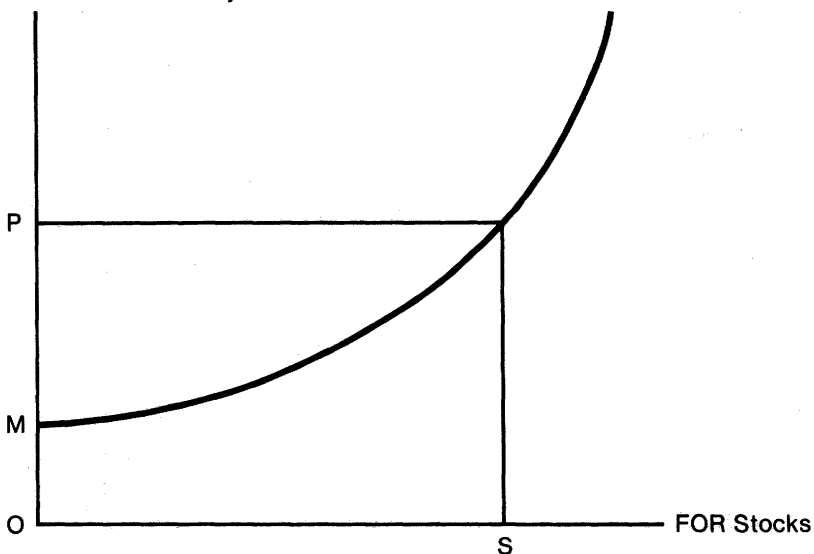
Many farmers would store grain in expectation of profits even if there were no FOR. Their decision to participate rests on

Figure 4

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**Expected Relationship Between Storage Subsidy and the Quantity of Grain in the Farmer-Owned Reserve**

Government subsidy/bu.





whether the total incentive (storage payment plus low-interest loan) exceeds the costs associated with the last two participation factors listed. This minimum incentive level is represented by M in figure 4. The addition of these stocks to the FOR would not increase immediately the level of total U.S. buffer stocks, but once placed in the FOR, these stocks would be held off the market until the market price was above the FOR release price.

For farmers who would not have stored grain without an FOR, the cost of participation would be higher. They would have to evaluate all the participation factors listed above as well as the cost of storage.

Consequently, from the farmer's point of view, storage costs are only part of the consideration in determining whether to participate in the FOR. At the national policy level, therefore, there is no economic logic for the storage payment being tied to the cost of storage. Rather, the storage payment should be the minimum amount needed to obtain the desired FOR stock level.

### Costs of Program Complexity

The farmer-owned reserve is a complicated Government program. It was changed frequently from 1977 to 1980 in response to unforeseen problems. This was to be expected, however, since the FOR was a totally new policy tool. Frequent changes were also required in the program trigger prices (loan rates, release prices, and call prices) and other parameters of the reserve as market conditions changed. In a world of double-digit inflation, the trigger prices required frequent adjustment. As an example of both its complexity and its frequency of change, consider the following adjustments made in the FOR for wheat in 1980:<sup>9</sup>

- At the start of 1980, wheat was in release status.
- On January 8, the wheat loan rate was raised, the storage payment was raised, and thereafter there were two reserve

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<sup>9</sup> Some of the listed changes were made in response to the suspension of grain sales to the USSR.

contracts—the “old agreement” for wheat placed in the reserve prior to January 4 and the “new agreement” for wheat placed in the reserve after January 4 (release and call prices were higher for the new agreement).

- On January 18, new agreement wheat was released.
- On March 3, new agreement wheat was no longer released.
- On March 18, wheat target prices were changed.
- On April 16, the interest rate on loans made after that date was raised.
- On May 2, old agreement wheat was no longer released,
- On May 8, old agreement wheat was released,
- On July 8, new agreement wheat was released.
- On July 28, a new wheat reserve agreement was established. Thereafter, old agreement was “Reserve I,” new agreement was “Reserve II,” and agreements after July 28 were “Reserve III.”
- On September 5, because of higher loan and release prices announced in July, no wheat agreement was in release status.
- On October 22, Reserves I and III were released.
- On December 3, the loan rate was raised for wheat put into reserve after this date, but release prices did not change. Interest was no longer charged on the first year of loan.

As a result of this complexity, there were indirect costs associated with FOR. Three are discussed here: the cost of administration, the cost faced by the potential farmer participant of keeping informed, and the cost to the private sector of uncertainty generated by the FOR.

**Cost of Administration.** During its first 3 years of existence, the complicated, frequently changing FOR program placed great demands on the bureaucracy. Complex rules had to be worked out in order to determine when the market price exceeded the release price. This required constant monitoring. Economic impact statements had to be prepared to justify any changes in the trigger prices. Farmers had to be made aware of rule changes through their local Agricultural Stabilization and Conservation Service (ASCS) offices. Thousands of farmers' contracts had to be modified when a change directly affected them. These costs were minor relative to other costs, but they were still significant enough to justify seeking ways to simplify the program.

**Cost of Keeping Informed.** Since it is a voluntary program, the FOR can be successful only if farmers participate. Farmers who are potential participants not only look at the direct costs and benefits of participating, but also the opportunity cost of their time in keeping informed, negotiating a contract, and managing that contract. This cost appears to be high for the FOR, and may be a factor limiting participation. If this is true, then payments for participation have to be higher in order to obtain a specified quantity of grain in the FOR.

**Cost Associated with Program Uncertainty.** The greatest indirect cost of the FOR over the last 3 years probably has been the uncertainty generated in the market by the day-to-day operative procedures of the FOR. A well-conceived grain reserve is supposed to reduce price variability over the long run, thereby reducing uncertainty and improving the efficiency of the entire grain-livestock sector. The FOR appears to have been successful in reducing price variability. But the operational rules and the administrative methods used over the last 3 years may have generated substantial uncertainty, partially offsetting the impact of reduced price variability. With the reserve, crop producers, livestock feeders, and others have to consider not only the usual market uncertainties as they make their plans, but also how the Government will manage the FOR. Probably the farmers most sensitive to this additional source of uncertainty are those who hold unhedged stocks of grain and/or those who feed livestock. Each of the FOR-related events in 1980 affected the grain price

outlook. Many of those events could not have been anticipated by the farmer. With greater uncertainty, less private stocks would be held. The complexity of the FOR and its frequent changes probably reduced the quantity of stocks held by the private sector. This would seem to run counter to the main purpose of the reserve.

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## Appendix

**Appendix table 1—Grain in the farmer-owned reserve at the end of each month, June 1977 to February 1981<sup>1</sup>**

Month	Wheat	Corn	Sorghum	Barley	Oats
	<i>Million bushels</i>		<i>Million cwt.</i>	<i>Million bushels</i>	
1977:					
June	1	—	—	—	—
July	5	—	—	—	—
August	10	—	—	—	—
September	15	—	—	—	—
October	24	—	—	—	—
November	45	—	—	—	—
December	64	—	—	—	—
1978:					
January	84	—	—	—	—
February	100	2	—	—	—
March	201	5	—	8	11
April	278	9	1	16	19
May	317	58	5	21	23
June	343	97	7	23	26
July	365	120	9	25	29
August	371	163	11	28	32
September	382	234	16	31	35
October	388	306	20	32	37
November	396	484	28	36	39
December	400	630	37	37	40
1979					
January	405	714	41	38	41
February	407	725	41	39	42
March	405	729	42	39	42
April	405	729	42	40	41
May	403	733	42	40	39
June	353	734	43	40	38
July	299	691	36	40	37
August	260	585	29	36	32
September	250	550	27	34	31
October	240	537	26	32	31
November	234	551	26	30	31
December	230	586	29	29	31

See notes at end of table.

Continued—

**Appendix table 1—Grain in the farmer-owned reserve  
at the end of each month, June 1977 to February  
1981<sup>1</sup>—continued**

Month	Wheat	Corn	Sorghum	Barley	Oats
	<i>Million bushels</i>		<i>Million cwt.</i>	<i>Million bushels</i>	
1980:					
January	222	645	34	26	30
February	222	716	36	25	30
March	227	757	37	24	30
April	234	798	39	24	30
May	237	858	40	0	30
June	232	873	40	1	30
July	225	867	36	4	26
August	225	826	29	5	23
September	222	729	18	7	21
October	220	638	11	11	11
November	214	592	4	10	5
December	228	704	3	11	3
1981:					
January	264	976	1	13	2
February	304	908	0	13	0

— = Expansion of the grain reserve to include the 1976 and 1977 corn, oats, sorghum, and barley crops was announced in December 1977, but actual entry did not occur until regular CCC loans matured and some early entry was permitted.

<sup>1</sup> Rice was also eligible for the reserve, but the quantity in the reserve never exceeded 150,000 hundredweight.

Source: Monthly ASCS-USDA reports.



**Appendix table 2—Corn and wheat price parameters  
for the farmer-owned reserve and CCC-owned stocks,  
1977-80**

Item	FOR price parameters for: <sup>1</sup>			CCC-owned sale price of stocks
	Loan	Release	Call	
<i>Dollars per bushel</i>				
Corn:				
1977 marketing year	2.00	2.50	2.80	—
1978 marketing year	2.00	2.50	2.80	3.00
1979 marketing year to January 1980	2.00	2.50	2.80	3.00
January-July 1980	2.10	2.63	3.05	3.15
August-December 1980	2.25	2.81	3.26	3.42
December 1980	2.40	3.00	3.48	3.65
Wheat:				
1977 marketing year	2.25	3.15	3.94	—
1978 marketing year	2.35	3.29	4.11	4.23
1979 marketing year to January 1980	2.35	3.29	4.11	4.23
January-July 1980	2.50	3.75	4.63	4.75
August-December 1980	3.00	4.20	5.25	5.83
December 1980	3.30	4.62	5.78	6.07

— = The legal minimum resale price for CCC-owned stocks was 150 percent of the loan rate under the 1977 Act; however, no price was announced for the 1977 marketing year.

<sup>1</sup> Once grain was placed in the reserve, the price parameters applicable to that grain could be changed. For example, the release and call prices on wheat placed in the reserve prior to January 1980 had been raised to \$4.20 and \$5.25, respectively, by August 1980.